THE INSTITUTE OF PHYSICS
47 BELGRAVE SQUARE, LONDON, S.W.1.

BULLETIN

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The Bulletin is not intended for general circulation : your copy should not therefore be passed to a library.

APPOINTMENTS VACANT

The inclusion of particulars of a vacancy must not be taken to imply that the Institute necessarily approves of the terms offered or that might be offered. Candidates should satisfy themselves that these are satisfactory, and they may always refer to the Institute for advice.

A well-known Company in Slough requires a man trained in the fields of Physics and Chemistry to undertake interesting development work. Age 25-30. Salary £800–£1,100 p.a. according to experience. Box No. 84, The Institute of Physics, 47 Belgrave Square, London, S.W.6.

Imperial Chemical Industries Limited
Billingham Division

has vacancies for **physicists** and **chemical engineers** for **Assistant Technical Officer** posts in their Engineering Research Laboratories. Candidates should be not more than 28 years of age and should have at least an Inter B.Sc. qualification or the equivalent. A pass degree would be advantageous. Attractive salaries are offered, dependent upon qualifications and experience. Financial assistance towards removal expenses available for married men. Excellent conditions of employment including Staff Pension Fund, Profit Sharing Scheme, etc. Write, without commitment, to the Staff Manager, Imperial Chemical Industries Limited, Billingham Division, Billingham, Co. Durham, quoting Reference No. D.7.

Physicists are required for research work on fundamental and applied problems associated with the production and use of aluminium alloys. The work is interesting and provides outstanding opportunities for men with initiative and enthusiasm to perform original research. The working conditions are good, and every encouragement is given to investigators anxious to benefit by their own efforts. A sound knowledge of physics is essential, and for the work on applied problems experience in the fields of thermal transfer analysis or chemical physics would be an advantage. The salary will be in accordance with age and experience. A pension scheme is in operation. Applications should be addressed to the Director of Research, **Aluminium Laboratories Limited,** Banbury, Oxon.

The British Iron and Steel Research Association

Operational Research : A vacancy has arisen for a capable science or engineering graduate in his early thirties to take over the leadership of a small team based in London and engaged in solving specific production engineering and control problems for individual firms in the iron and steel industry. A wide range of enquiries are dealt with and familiarity with operational research and/or work study methods would be an advantage.

The main duties of the leader of the team are to visit companies and discuss problems and solutions with the managements. Ability to recognize the essentials of problems is of major importance. Salary in the range £1,080 to £1,400 according to age, qualifications and experience. Post is superannuated under the F.S.S.U. Written applications only quoting "O.R." to Personnel Officer, B.I.S.R.A., 11 Park Lane, London, W.1.

British Thomson-Houston Company Ltd., invites applications from science graduates for research on crystallography; previous experience in this field is not essential, but would be an advantage. Apply, quoting reference JAJ(2) and stating age, qualifications and experience to the Director of Research, British Thomson-Houston Company Ltd., Rugby.

University College of North Staffordshire

Applications are invited for the post of **Assistant Lecturer in Physics.** Salary in the scale £600 × £25–£650 p.a., with F.S.S.U. and children's allowances. Interest in and ability to teach theoretical physics will be welcomed. Application forms, in duplicate, should reach the Registrar, The College, Keele, Staffs., from whom further particulars and application forms may be obtained, not later than September 30, 1955.

Semi-conductor Research

There are vacancies in the company's research laboratory at Rugby for **Physicists** to work in a small but expanding group on the development of semi-conducting materials. Graduate physicists are required to devise methods for producing the material in perfect crystalline form and for assessing its characteristics : others qualified at least to Higher National Certificate standard are wanted as **Laboratory Technicians** to assist in the above work.

Applicants are invited to write to the Director of Research, **British Thomson-Houston Company Ltd.,** Rugby, quoting reference W1.

Senior Lighting Development Engineer wanted for factory in the North Midlands. Age preferably between 30 and 35. Applicants should possess a degree in physics or engineering, or Higher National Certificate, and should be experienced in the design and development of lighting equipment. Good salary and excellent prospects. When replying please give full details of age, education, technical experience and salary required. Our own staff have been informed of this vacancy. Apply Box 85, The Institute of Physics, 47, Belgrave Square, London, S.W.1.

Atomic Energy Research Establishment, Harwell, has vacancies for **physicists** in its Reactor Physics Division to study the physical principles underlying a wide variety of nuclear reactors. Fields of work include determining nuclear constants, designing and experimenting with low power reactors, and taking part in the design of nuclear power stations.

Appointments will be made in the following grades according to age, experience and qualifications :

(i) **Scientific Officer** Class : Minimum qualifications of Second Class Honours Degree in Physics. Successful candidates will be appointed either in the grade of Principal Scientific Officer (£1,205–£1,615 p.a.) or Senior Scientific Officer (£1,040–£1,205 p.a.) or Scientific Officer (£505–£905 p.a.).

(ii) **Experimental Officer** Class : Minimum qualifications of Higher School Certificate in science subjects, or equivalent qualifications. Successful candidates will be appointed either in the grade of Senior Experimental Officer (£1,090–£1,285 p.a.) or Experimental Officer (minimum age 26, £775–£945 p.a.) or Assistant Experimental Officer (£910 at age 18 - £685). The rates for women are slightly less than those stated above.

Successful candidates will be required to join the Authority's contributory superannuation scheme. Requests for Application Form should be sent on a post card to the Establishment Officer, U.K. Atomic Energy Authority, A.E.R.E. Harwell, Didcot, Berks., quoting 2/103/380.

Transistors. A few vacancies exist for qualified men in our expanding transistor development and manufacturing groups. Positions are available for **Chemists, Physicists** and **Engineers** with an interest or experience in transistors, diodes and materials problems associated with these devices.

After a period in the Somerset Laboratories the men engaged will be transferred next year to our new establishment now being constructed at Paignton in the Torbay area of Devon. The Company offers a non-contributory pension scheme, group life insurance plan, generous sickness plan and provides three weeks' holiday after short service.

Men who consider they have suitable qualifications or experience should write giving full details and salary required. Interviews can be arranged in London or at the following address to which all replies should be sent : Personnel Manager, **Standard Telephones and Cables Ltd.**, Dowlish Ford Mills, Ilminster, Somerset.

Fibreglass Limited, St. Helens, require a **Physicist** to undertake research into the problems of manufacture and application of Fibreglass and into the properties of materials formed by the combination of Fibreglass with other substances. An honours degree in Physics or a first class general degree with Physics as a main subject is essential. Industrial experience would be considered an advantage, particularly if it were related to acoustic or heat insulation, fibre formation or the physical properties of fine fibres.

Applicants should write to the Personnel Liaison Officer, Pilkington Brothers Limited, Grove Street, St. Helens, (of whom Fibreglass Limited is a subsidiary Company) giving details of age, qualifications and experience.

There are vacancies in the Company's Research Laboratories at Rugby in a group engaged on the development of semi-conductor devices and their associated circuitry. Requirements are for :—

(i) Qualified Physicists or Electrical Engineers as **Senior Development Engineers.**

(ii) An **Engineer** to take charge of and organise small scale experimental production in the Research Laboratory, of small electrical devices.

(iii) Qualified **Electronic Circuit Engineers** for the exploratory development of transistor circuits.

(iv) **Laboratory Assistants** with Ordinary National Certificate in physics, electrical engineering or chemistry. There will be staff appointments for suitable applicants.

Applicants are invited to write to the Director of Research, **British Thomson-Houston Company Ltd.,** Rugby, quoting reference HR.

Research Scientist or **Engineer** required to work on problems of mechanical firing and automatic control of sectional boilers. The post is an opportunity for a keen man, interested in this type of research, to get experience with a highly-instrumented installation which offers unique facilities for experimental work suitable for publication. Applicants should have degree or equivalent in Physics or Engineering. Age 22-28. Starting salary in range £900–£800. Apply in writing to the Asst. Secretary, Ref. B.40, **British Coal Utilisation Research Association,** Randalls Road, Leatherhead, Surrey.

Research Scientist or **Engineer** required to work on development of new methods of central heating. The post is an opportunity for a keen worker with research ability and initiative to join in a project which is already achieving success and is of national value. Results of research to be published. Applicants should have B.Sc. or equivalent, preferably in Physics. Age 22-28. Starting salary in range £600–£800. Apply in writing to the Asst. Secretary, Ref. B.41, **British Coal Utilisation Research Association,** Randalls Road, Leatherhead, Surrey.

The United Kingdom Atomic Energy Authority require **Physicists** at Windscale Works, Cumberland (Ref. 1,063), and Dounreay Works, Caithness, Scotland (Ref. 1,064), to be responsible to the Group Managers for the efficient operation of the Health Physics and Safety Groups. The work will involve the measurement and control of radioactive hazards, together with operational control of a Works Group concerned with decontamination and the disposal of radioactive waste. Candidates should hold an Honours Degree in Physics ; be Associates of The Institute of Physics ; or have equivalent qualifications. Experience in management and the handling of problems associated with radioactive materials and radiation is desirable. Salary £1,065–£1,370 p.a. All new entrants under the age of 55 automatically join the Authority's contributory pension scheme. Housing accommodation will be available within a reasonable time for the successful candidates, if married. Send post card for application form to Recruitment Officer, U.K.A.E.A., Industrial Group Headquarters, Risley, Nr. Warrington, quoting appropriate reference.

Timber Development Association Limited. The Research and Development Committee invites applications for appointment as **Scientific Officers, Senior Scientific Officers** and **Principal Scientific Officers** qualified in physics, engineering or chemistry, and Scientific Officers in biology. Candidates should hold university degrees in appropriate subjects or be able to produce other evidence of suitable scientific or professional attainment or experience. Applicants for appointment as Scientific Officer should have attained the age of 24 years and for Senior Scientific Officer should have at least four years' appropriate postgraduate or other approved experience. Salaries will be in the following ranges :

Scientific Officers - -	£600– £900 p.a.
Senior Scientific Officers -	£1,000–£1,300 p.a.
Principal Scientific Officers	£1,400–£1,700 p.a.

An advantageous staff pension scheme is provided. In the lower grades commencing salaries will be commensurate with the age, qualifications and experience of the successful candidates. Officers appointed will be attached to a newly-organized research unit working with a design and development group at laboratories situated near High Wycombe, Buckinghamshire. The work will include research into the structure, properties, treatment and processing of timber and plywood ; elastic and plastic behaviour in stiff-jointed assemblies ; the performance of framed, laminated and shell structures subjected to intermittent loading, with particular reference to wind-resisting structures and containers ; electronic and other forms of instrumentation applied to destructive and non-destructive testing ; the development fo design criteria and method for a wide range of industrial ues, with ample opportunities for original research.

Applications, with full details of age, qualifications and experience should be addressed to The Director, Timber Development Association, 21 College Hill, London, E.C.4, to be received not later than Friday, September 23, 1955.

Physicist with some industrial or laboratory experience wanted for interesting work relating flame radiation measurements on experimental furnace to radiation theory. The work includes opportunities to take part in internationally arranged experiments on the flame radiation furnace at Ijmuiden, Holland. Initial salary in the range £1,000/£1,200 per annum. Appointment for three years in the first instance.

Junior Physicist (Graduate) to assist in the above project also wanted ; salary in the range £600/£800 per annum. In each case possibility of studying for higher degree at a Netherlands University.

Applications should be sent to Professor M. W. Thring, University of Sheffield, St. George's Square, Sheffield, 1.

The British Iron and Steel Research Association requires science graduates or staff possessing comparable qualifications for the Fluid Dynamics Section of the Physics Department. The work to be undertaken includes studies of the flow of furnace gases and the transport of solids in gas streams applied to problems of Gas Cleaning and new methods of making steel. Previous experience is not essential but a sound knowledge of classical physics and a mathematical or an experimental aptitude are required. The laboratories are situated in London and visits will be made to various steelworks. Salaries within the range £650 to £900 p.a. according to age, qualifications and experience. Posts are superannuated under the F.S.S.U. Written applications only, quoting " F.D.I." to Personnel Officer, B.I.S.R.A., 11 Park Lane, London, W.1.

PHYSICISTS

Simon-Carves Ltd.

require physicists for research work in a number of fields—fluidization, flame combustion, electro-precipitation, small particle behaviour, reaction kinetics, applied thermodynamics and pneumatic techniques.

Candidates should be university graduates or have professional qualifications of Associate Membership standard.

Salaries will be in the range £750–£1,250, depending on experience. The posts are at Stockport. Working conditions are excellent ; scope is good ; a pension scheme is in operation. Please send brief relevant applications (quoting Ref. BN 43) to Staff and Training Division, Simon-Carves Ltd., Cheadle Heath, Stockport.

Vacancies exist in the research department of **Imperial Chemical Industries Limited**, Billingham Division , for **chemists** and **physicists** experienced in analytical and structural work utilizing X-ray and electron diffraction, X-ray spectrometry and electron microscopy. The problems cover a wide range of chemical and metallurgical subjects and include active developments of new techniques and apparatus. The opportunities for scientific and financial progress are both good. Write, giving full details of age, qualifications and experience to the Staff Manager, Imperial Chemical Industries Limited, Billingham Division, Billingham, Co. Durham, quoting reference C.6.

E.M.I. Engineering Development Ltd.
Senior Engineer/Physicist

An attractive vacancy exists at this Company's Feltham laboratories for a Senior Engineer/Physicist to work on a number of theoretical problems in the G.W. field. The man we are looking for will be qualified and will have had some related experience. His main responsibility will be to devise series of critical laboratory and field experiments in connection with weapon developments. An attractive salary will be offered to the successful applicant for this pensionable post, and the prospects in this active and expanding Company are excellent. Please send your first reply to, Personnel Department (ED/238), E.M.I. Engineering Development Ltd., Blyth Road, Hayes, Middlesex.

Associated Electrical Industries Limited

Applications are invited from :

(1) **Electrical or Mechanical Engineers,**
(2) **Experimental or Theoretical Physicists** and
(3) **Engineering or Scientific Assistants,**

for vacancies in a Research Group working on nuclear reactors.

All the vacancies are for persons aged up to about 30. The salary offered will be dependent upon qualifications and experience. The minimum qualifications for posts in groups (1) and (2) above are an honours degree or its equivalent ; the salary range in these groups is £550 to £1,300 per annum. In group (3) the qualification range is National Certificate or its equivalent to ordinary degree level or its equivalent ; the salary range is £500 to £1,050 per annum.

The Reactor Group is situated at the Research Laboratory of Associated Electrical Industries Limited, at Aldermaston Court, Aldermaston, Berkshire. The Laboratory is engaged on long-term research and serves a large group of companies. The posts offer a unique opportunity to obtain experience and to engage in research within industry in this new and important field of nuclear reactors.

The Laboratory is situated in pleasant rural surroundings near Reading.

Please write giving full details of qualifications and experience to :—Personnel Officer, Research Laboratory, Associated Electrical Industries Limited, Aldermaston Court, Aldermaston, Berkshire.

The British Petroleum Company Limited invites applications from young Graduates with a degree in Engineering, Physics, Mathematics or Natural Philosophy, to be trained as Petroleum Engineers. Training will last for approximately 2 years and will take place partly in the United Kingdom and partly overseas. On successful completion of the training, men will be posted as **Resident Petroleum Engineers** to exploration areas overseas. Age preferably not over 26, National Service obligations must have been fulfilled. Write stating age and full details of qualifications and experience quoting H.2089 to Box 7649. c/o 191 Gresham House, E.C.2.

British Thomson-Houston Co. Ltd. invites applications for posts in the Metallurgy Section of its Research Laboratory at Rugby. The work consists of research in physical metallurgy with particular reference to high temperature properties and strength of alloys. Applicants should be graduates or have high qualifications in Metallurgy, or Physics, and preferably be under 35. Apply, quoting reference OG, and stating age, qualifications and experience to the Director of Research, British Thomson-Houston Co. Ltd., Rugby.

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THE INSTITUTE OF PHYSICS

Vol. VI, No. 9 **BULLETIN** SEPTEMBER, 1955

NOTICES TO MEMBERS

Electronics Group Symposium

A symposium on "Some Recent Developments in Magnetic Materials" has been arranged by the Electronics Group and will be held at the Institute's House on Friday and Saturday, September 23 and 24. Seven papers are to be read and discussed ; details may be obtained from the Deputy Secretary on request. Non-members of the Institute may attend on payment of a fee of £1 1s. 0d.

Stress Analysis Group

The Institute's Stress Analysis Group is holding its Ninth Annual Conference at Stephenson Hall, University of Sheffield, on September 28, 29 and 30. Full details and forms of application to attend may be obtained from the Deputy Secretary on request. Non-members of the Institute may attend on payment of a conference fee of £1 1s. 0d.

British Nuclear Energy Conference: Inaugural Meeting

In the June *Bulletin* was an announcement of the establishment of a new organization for the consideration of developments in the technology of nuclear energy. This organization, the British Nuclear Energy Conference, is a permanent consultative body formed by the Institutions of Civil, Mechanical, Electrical and Chemical Engineers and The Institute of Physics.

The inaugural meeting of the Conference is to be held at the Institution of Civil Engineers from 2.15 p.m. to 8.15 p.m. on Wednesday, November 30, 1955.

The meeting will be opened by the Chairman, Sir Christopher Hinton, after which the following lectures will be be delivered :

"The United Kingdom Atomic Energy Project" by Sir John D. Cockcroft.

"The Place of Nuclear Energy in United Kingdom Power Development" by V. A. Pask and J. C. Duckworth.

"The Use of Research Reactors in Nuclear Power Development" by H. J. Grout.

"Health and Safety in a Nuclear Power Industry" by A. S. McLean and W. H. Marley.

Attendance at this symposium will be confined to members of the five participating societies and will be by ticket only. Members of The Institute of Physics who would like to attend and have not already applied for tickets should do so as soon as possible to the Secretary of the Institute. Preprints of the lectures will not be available, but the papers and the discussion upon them will be published in the first issue of the *Journal* of the British Nuclear Energy Conference. Sir John Cockcroft's lecture will also be published in the *British Journal of Applied Physics*.

Colloquium on Luminescence

The Laboratory of Luminescence of the Faculty of Science of Paris (Profs. Maurice Curie and Georges Destriau), in collaboration with the Centre National de la Recherche Scientifique, is arranging an international Colloquim on 'The Luminescence of Inorganic Crystalline Bodies.' This will take place in Paris from May 22 to 26, 1956. Several European and American visitors have already agreed to participate. There will be five sessions as follows :

(1) Luminescence centres, electron traps.

(2) Band theory, excitors, non-luminescent transitions.

(3) Photoconductivity, photodielectric effect, Hall effect in crystalline phosphors, etc.

(4) Electroluminescence.

(5) Cathodoluminescence, scintillations, various topics.

Papers, which should not exceed 2,500 words and if possible be accompanied by a French translation, must be submitted to the Secretaries of the Colloquium before December 15 next. Further details can be obtained from Drs. N. Arpiarian and D. Curie at Laboratoire de Luminescence, Faculté des Sciences, 12 rue Cuvier, Paris 5e, France.

THE AVAILABILITY OF PLACES FOR PHYSICS STUDENTS IN UNIVERSITIES AND TECHNICAL COLLEGES

The Report and comments upon it were approved and adopted by the Board of The Institute of Physics on July 19, 1955.

In November, 1954, the Board of The Institute of Physics decided to make a survey of the facilities existing in universities and technical colleges for the education of physicists and of the extent to which these were at present being used. Among the reasons which led to this decision were the public discussion of the need to develop facilities for higher technological education (to which discussion the Institute has contributed over the past few years), and various reports that had been presented to the Board on the difficulty experienced by certain technical colleges in securing students for courses in physics for which the colleges were well equipped and which had been running, in some cases, for several years.

FORM OF INQUIRY

A letter of enquiry was sent to thirty-three university departments of physics asking for the following information :—

(i) The number of students admitted to the Honours school of physics in each year since 1949.

(ii) The number of these students who have failed to complete the course or have failed the final examination.

(iii) The maximum number of students that could be admitted if sufficient applications were received from students of adequate quality.

A printed inquiry form, reproduced as Appendix III to this report, was sent with a personal covering letter to the Principal of each of the technical colleges recognized by the Institute for the purpose of its membership regulations and to the Principal of each of a small number of other colleges at which it was known that courses for the Ordinary National Certificate in Applied Physics were being run.

The replies received were as follows :—

Table 1

	Enquiries sent	*Replies received**
Universities	33	27
Technical Colleges	54	53

*See Appendices I and II (p. 212 and p. 213)

UNIVERSITY DATA

It is not possible to give exact totals of admissions or failures for all the universities from which replies have been received. One or two replies gave only average figures and, of more significance, the procedure for the selection of honours students varies among British universities. Some, for example Reading, require candidates for the Special degree in physics to have completed the General degree course first ; in the University of Wales many of those taken into the Honours school are selected students who have obtained the pass B.Sc. degree. Again, for the purpose of the Institute's regulations, Part II of the Natural Sciences Tripos of the University of Cambridge is regarded as the equivalent of the Honours or Special degree of other universities and selection for admission to this course is made on the basis of results in the Part I of the Tripos. Many students of other universities who are admitted to the first year of a three year course for the Honours degree and are unable to complete the course would have been eliminated at Cambridge at the Part I level and perhaps diverted to specialization in another subject.

It appears that about 750 students are admitted each year into the courses for the Honours degree in physics, or its equivalent, in the universities for which information is available. Other students will no doubt have begun a university course with the intention of reaching the Honours physics degree but will have failed to secure admission although reaching the standard of a General degree, Pass degree or Part I of the Natural Sciences Tripos ; no information is available about the number of these students. The total of admissions in each of the years since 1949 does not appear to have varied by more than about 10 per cent. One or two university departments, notably Leeds and Imperial College, London, have significantly increased the intake in the last year.

The number of additional students that could be accepted into the present university departments is about 170 a year or roughly 25 per cent.

Because of the variation in the method of selection that is referred to above, precise figures cannot be given for the number of candidates failing to complete the course or failing in the final examination. However, taking eleven departments in which the basis of entry is similar and for which the information supplied is easily comparable, there was a total entry in 1949 of 367 students of whom 247 completed the course (but some of whom obtained only an Ordinary or Pass degree). The corresponding figures for 1951, the last year of entry for which complete information about examination results is obtainable, are an entry of 378 with 257 completing the course. This is probably

a much higher proportion of failures than is generally supposed. On the other hand, Oxford, with its large Honours school of about 80 entrants a year, has a rate of failure of only about 5 per cent which may reflect more intense competition among the ablest students to obtain places there.

The foregoing figures, showing that the intake is only about 80 per cent of the number that could be accepted and that a substantial proportion of the intake fails to complete the course reflect upon the quality of applicants for university entrance. Some of the professors supplying data have also commented upon this quality. Whilst some departments are satisfied with the standard of their intake, more appear to take a less favourable view. The following are representative extracts from replies.

(*a*) " My impression is that, not only at this University but generally, methods of selection are not very good. There are a few good students who are accepted and a large number of mediocre ones. There is a considerable chance factor about which of these latter are accepted and it is probable that a few who have been badly taught, or who are intellectually immature but capable of a great deal of development, are rejected. However, our real difficulty is lack of sufficient candidates who can be accepted with confidence."

(*b*) " We have no complaint about the quality of applicants. There is of course some wastage during the course, but I think this is inevitable. We do not deliberately take people with the idea of weeding some out."

(*c*) " Owing to the gradual lowering of standards in the G.C.E. (an inevitable consequence of the procedure by which a more or less fixed percentage pass or get a grading of 60 or over in the G.C.E., however many candidates enter), the distortion in teaching in some schools due to the determination at all costs to get students through these examinations and also of course the real difficulties in many cases in connection with the teaching of physics in schools, the paper performance in the G.C.E. examinations is a very uncertain guide to probable future performance."

(*d*) " I have not yet come to any conclusions about whether the average quality of student is the same as it was, say, five years ago when our intake was half as much, but my impression is that it is not lower."

(*e*) "I think there is no doubt that the examination performances (at the G.C.E. Advanced level) of our entrants are becoming less reliable

as an indication of quality. Their performance is quite frequently merely a measure of the quality of the physics teaching available, and I feel that the best procedure at present is to accept quite a large proportion of doubtful cases and discard heavily at the end of the first year."

(*f*) ". . . so far as this college is concerned the limiting factor is the number of good students."

TECHNICAL COLLEGE DATA

In presenting the data obtained from technical colleges, the central London polytechnics and two other London colleges have been grouped separately ; several of them are " internal " schools of the University of London. The ten Colleges referred to here as " London " are The Polytechnic, Regent Street ; Battersea, Borough, Chelsea, Northampton, Northern and Woolwich Polytechnics ; South-East London Technical College, Sir John Cass College and West Ham Technical College.

(*i*) *Full-time physics staffs*

The number of physicists on the full-time staffs of those departments of colleges responsible for teaching physics is 342. They are graded as follows (see Appendix IV for details of grades).

Table 2—*Grading of physics staffs*

	Head of Department	*Senior Lecturer*	*Lecturer*	*Assistant Lect. (B)*	*Assistant Lect. (A)*	*Total*
London (10)	9	25	35	26	3	98
Other colleges (43)	32	25	71	90	26	244
All colleges (53)	41	50	106	116	29	342

(*ii*) *Degree students*

(*a*) *Special physics degree*

Table 3 gives the numbers of students from these colleges who sat the final examination for the Special physics degree of the University of London in the years stated.

Table 3—*Candidates for special physics degree*

	1949		1950		1951		1952		1953		1954	
	Full Time	*Part Time*	*Full Time*	*Part Time*	*Full Time*	*Part Time*	*Full Time*	*Part Time*	*Full Time*	*Part Time*	*Full Time*	*Part Time*
London colleges	40	16	69	21	131	30	85	25	75	23	38	32
Other	17	8	14	13	41	15	51	16	46	24	35	23
Total	57	24	83	34	172	45	136	41	121	47	73	55

Eight of the London colleges have been regularly presenting full-time candidates for the degree ; the number of other colleges presenting students rose from 8 in 1949 to 11 in 1953, falling to 8 again in 1954.

In 1954 only 2 colleges presented as many as 10 full-time students (Regent Street 14 ; Acton 12).

No information is available upon the proportion of the above students passing the examination.

Twenty-seven colleges state that with present staff and equipment they can offer the Special physics course ; between them they could offer about 250 places.

(*b*) *General degree*

Numbers of full-time and part-time students taking the final examination for the London General degree with physics as one subject are given in Table 4. No information is available on the proportion of passes.

Table 4—*Candidates for General degree*

	1949		1950		1951		1952		1953		1954	
	Full Time	*Part Time*	*Full Time*	*Part Time*	*Full Time*	*Part Time*	*Full Time*	*Part Time*	*Full Time*	*Part Time*	*Full Time*	*Part Time*
London colleges	53	83	75	97	66	92	75	110	73	118	47	118
Other	84	126	170	135	206	134	210	196	153	209	128	212
Total	137	209	245	232	272	226	285	306	226	327	175	330

The greatest number of colleges presenting any full-time students has been 33 (in 1953) ; the greatest number presenting part-time students was 39 (in 1954).

In 1954, 5 colleges presented 10 or more full-time students (South-West Essex, Walthamstow 16 ; Sir John Cass 12 ; Acton 11 ; Chelsea 11 ; Brighton 10). In the same year 11 colleges entered 10 or more part-time students (Sir John Cass 35, Salford 25, Acton 21, Chelsea 19, Northern 18, Woolwich 18, Birmingham 14, South-East Essex 13, Regent Street 12, Croydon and Leicester 10 each).

(*iii*) *Non-degree work*

Apart from degree courses, the classes in physics offered by technical colleges may be grouped as (i) General Certificate of Education (ii) National Certificates in Applied Physics (iii) ancillary classes for students of engineering or other sciences, and (iv) series of postgraduate or " post-advanced " lectures on specialized branches of physics, usually applied. It is not possible to give data here on groups (iii) and (iv). The work in group (iv) is almost invariably for part-time students, as is most of that in group (iii). In addition, a very few

colleges, the most important being the Royal Technical College, Glasgow, have advanced courses leading to their own awards.

(*a*) *General Certificate of Education*

The data relating to the General Certificate of Education were sought for the current year only. It would, however, have been of interest to know whether the big demand on colleges for work of this standard had increased during the past few years.

The data for the current session are given in Table 5.

Table 5—*General Certificate of Education*

	Advanced level				*Ordinary level*			
	Full-time		*Part-time*		*Full-time*		*Part-time*	
	Colleges	*Students*	*Colleges*	*Students*	*Colleges*	*Students*	*Colleges*	*Students*
London	6	514	6	650	2	55	3	199
Other	21	938	23	1586	12	407	15	497
Total	27	1452	29	2236	14	462	18	696

(*b*) *National Certificates in Applied Physics*

National Certificates in Applied Physics have been established only since the war. All study is part-time. Table 6 gives details of colleges offering courses and of numbers of students in the *final* years of the Ordinary course (3 years) and Higher course (2 years) in 1951-2 and 1954-5.

Table 6—*National Certificate students in final year*

	1951–2				1954–5			
	Ordinary		*Higher*		*Ordinary*		*Higher*	
	Colleges	*Students*	*Colleges*	*Students*	*Colleges*	*Students*	*Colleges*	*Students*
London	2	77	2	17	2	68	2	45
Other	10	81	5	19	22	233	8	30
Total	12	158	7	36	24	301	10	85

In 1954-5 a further 3 colleges had courses running in the first and second years of the Ordinary Certificate.

The report has been written by the Deputy Secretary of the Institute, Mr. N. Clarke, F.Inst.P., by whom the inquiry was conducted. The comments on the report (pp. 209-11) have been prepared by the Institute's Education Committee and its Membership and Examinations Committee, the Chairmen of which are respectively Dr. W. H. Taylor, F.Inst.P., and Mr. H. P. Rooksby, F.Inst.P.

Comments of the Education Committee and Membership and Examinations Committee of The Institute of Physics on the report on

THE AVAILABILITY OF PLACES FOR PHYSICS STUDENTS IN UNIVERSITIES AND TECHNICAL COLLEGES

The data presented in the accompanying report clearly indicate that existing facilities for the education of physicists in universities and technical colleges in Great Britain are more than adequate for the number of students who wish to read for an honours degree in physics and who leave school with qualifications normally regarded as essential for admission to the honours course. Indeed, all such students can at present be educated in the universities and there appears to be little need for the provision of full-time technical college courses leading to the honours degree in physics ; even the effect of the abnormally high birth-rate of the immediate post-war years, which will be seen within the next ten years, is unlikely to make necessary full-time degree courses in the technical colleges.

It is commonly assumed that there is keen competition to secure university places. This survey shows clearly, however, that the available university places in physics are not all filled and, further, that a disturbing proportion, probably of the order of one-third, of those accepted do not complete the honours course. This merits very careful consideration. The suggestion has already been made,* on the basis of an enquiry into the subsequent careers of unsuccessful applicants for admission to the physics school of the University of Bristol, that " the intense competition for admission is largely illusory." Taking evidence of this kind with that revealed by the present survey, it would seem that, over the country as a whole, there is little effective selection of students by the universities. Nearly all school-leavers who satisfy the minimum departmental and faculty requirements and who wish to read physics are able to secure admission to a university honours school of physics, although there is certainly some competition for places in those departments with the highest reputations.

The universities select their own students. About one-third of those selected fail to complete the course for which they are accepted ; some of the unsuccessful students are diverted to other courses but the waste of the time of teachers and students must be substantial. It is unfortunate that the examination results for the General Certificate of Education and the reports from headmasters do not provide an adequate basis upon which the universities can make a satisfactory

* N. F. Mott and N. Thompson, *Universities Quarterly*, 1954, p. 380.

selection, but the responsibility lies upon the universities to devise a more effective system of selection. There is wide agreement among university teachers that the results of the Advanced level examination of the General Certificate of Education are becoming less reliable as an indication of real ability in a subject.

If the number of suitable candidates is to be increased to any significant extent it will be by attracting to physics the type of boy now going to the university to read for a degree in some other subject, not necessarily a science subject, and succeeding in obtaining a good degree. University physics departments that have run courses in physics for students of the humanities have found that some of those students have realized for the first time the intellectual satisfaction of physics properly presented. The poor teaching of physics in some schools and the prejudice shown against all science subjects in other schools no doubt result in some able boys failing to appreciate the satisfaction of a scientific career. In this respect the need for early specialization in schools may have an adverse effect on the number of physics students at universities. Furthermore, some schools appear to be unaware of faculty and departmental requirements of physics honours schools ; for example, some otherwise acceptable students find themselves with insufficient mathematical knowledge for admission to a physics department. A specially designed course for such candidates extending over a preliminary year might produce some very satisfactory students ; some of them might find a course in applied physics, such as those to be introduced soon in a few technical colleges, more suitable to their abilities and aptitudes.

Despite the foregoing comments, the most important factor determining the number of potential honours students of physics is that the course demands a degree of mathematical ability and a capacity to grasp difficult abstract concepts that are comparatively rare. This fact is not always sufficiently appreciated. Many students who have done well in physics and mathematics at school find that they have reached their intellectual " ceiling " by the end of the first or second year of university study of these subjects. They will not find it possible to master the final year course and more use might be made by the universities of the courses leading to Ordinary degrees, into which students of this kind could be guided at the end of their first year of university study. Alternatively, some students might be better advised to transfer to a course in a major technical college.

The data of this report refer entirely to physics. No information is available about any other subject, but it is not unreasonable to suppose that the position in at least some other sciences and perhaps in some branches of engineering may be broadly similar to that here

disclosed. If this should be so, then it is clear that in any discussion of the possible expansion of the facilities for higher technological education it is essential to realize that the main obstacle is the shortage of students of adequate quality.

So far as physics in technical colleges is concerned, it is disappointing to note that the principal work of so many colleges appears to be of the type normally regarded as more appropriate to a university or to a grammar school. Most colleges have either not experienced or have failed to respond to any demand for courses in the more technical aspects of physics. It is, however, encouraging to see that there is a growing demand for courses for the National Certificates in Applied Physics. Some of the colleges in which applied physics has been developed are now beginning to establish "sandwich" courses in applied physics. These will be at a high standard; they represent work that is genuinely and traditionally the function of technical colleges.

APPENDIX I

Universities from which data have been received

Birmingham
Bristol
Cambridge
Durham (King's College, Newcastle-upon-Tyne)
Hull
Leeds
London :
- Bedford College
- Birkbeck College
- Imperial College
- King's College
- Queen Mary College
- Royal Holloway College

Manchester (Faculty of Science and Faculty of Technology)
Oxford
Reading
Sheffield
Southampton
Aberdeen
Edinburgh
Glasgow
St. Andrews
University College of North Staffordshire
Wales :
- University College of Wales, Aberystwyth
- University College of North Wales, Bangor
- University College of South Wales and Monmouthshire, Cardiff
- University College of Swansea

APPENDIX II

Technical Colleges that have supplied data

Colleges marked * were, at the time of the inquiry, recognized by the Institute for the purpose of its membership regulations. The other colleges were recognized only for the Ordinary National Certificate in Applied Physics.

*Acton Technical College
*Birmingham College of Technology
*Blackburn Technical College
Bournemouth Municipal College of Technology and Commerce
*Brighton Technical College
*Cardiff College of Technology
*Chelmsford, Mid-Essex Technical College
Croydon Polytechnic
*Crumlin, Technical College of Monmouthshire
*Dagenham, South-East Essex Technical College
*Derby, Technical College
*Edinburgh, Heriot-Watt College
*Glamorgan Technical College
*Glasgow, Royal Technical College
*Gloucester Technical College
*Guildford Technical College
Harrow Technical College
*Huddersfield Technical College
*Kingston Technical College
*Leeds College of Technology
*Leicester College of Technology and Commerce
Letchworth, North Herts Technical College
*Liverpool College of Technology
London :
  *Battersea Polytechnic
  *Borough Polytechnic
  *Chelsea Polytechnic
  *Northampton Polytechnic
  *Northern Polytechnic
  *The Polytechnic, Regent Street
  *South-East London Technical College
  *Sir John Cass College
  *West Ham College of Technology
  *Woolwich Polytechnic
*Loughborough College of Technology
Luton and South Bedfordshire College of Further Education
Newbury, South Berkshire College of Further Education

*Norwood Technical College
*Nottingham and District Technical College
*Oxford College of Technology, Art and Commerce
*Portsmouth College of Technology
*Preston, Harris Institute
Reading Technical College
*Rotherham College of Technology
*Salford, Royal Technical College
Salisbury and South Wiltshire College of Further Education
Stoke-on-Trent, North Staffordshire Technical College
*Sunderland Technical College
*Swansea Technical College
Weybridge, Brooklands County Technical College
*Wigan Mining and Technical College
*Wolverhampton and Staffordshire Technical College
*Walthamstow, South-West Essex Technical College
Worcester, Victoria Institute

APPENDIX III

The inquiry form sent to technical colleges is reproduced below

---

January, 1955

College.....

1. In which department of the college is physics incorporated ?

   .....

2. What is the present complement of physics staff (numbers of each grade) ?

   Head of Department.....

   Senior Lecturer..... Assistant Grade B.....

   Lecturer ..... Assistant Grade A .....

3. What have been the numbers of candidates taking the final examination for the Special degree of the University of London in physics in the years indicated ?

Year	1949		1950		1951		1952		1953		1954	
	Full time	Part time	Full time	Part time	Full time	Part time	Full time	Part time	Full time	Part time	Full time	Part time
Nos.												

4. What have been the numbers of candidates taking the final examination for the General degree of the University of London, with physics as one subject, in the years indicated ?

Year	1949		1950		1951		1952		1953		1954	
	Full time	Part time	Full time	Part time	Full time	Part time	Full time	Part time	Full time	Part time	Full time	Part time
Nos.												

5. What are the present numbers of students in each year beyond Intermediate or G.C.E. Advanced level of the courses for the General degree and Special Physics degree ?

General	Full-time	Part-time
1st ...	.....	.....
2nd...	.....	.....
(3rd)...	.....	.....

Special	Full-time	Part-time
1st ...	.....	.....
2nd...	.....	.....
(3rd)...	.....	.....

6. With the present staff and equipment of the physics section or department, how many students could you accept into each year of a course for the General or Special degrees ?

General.....(per year) Special .....(per year)

7. Are there courses for the Ordinary or Higher National Certificate in Applied Physics ? If so please give numbers of students in each year.

	1951–52	1952–53	1953–54	1954–55
S.1				
S.2				
S.3				
A.1				
A.2				
Grad.Inst.P.				

8. What other courses in physics are actually running in the department ? (Please give number of students and whether full-time or part-time.)

9. Any other information or comments.

Date ..... Signed.....

Status in College.....

APPENDIX IV

Technical College Staff Gradings

Some indication of relative status of grades is afforded by the following basic salary data.

Assistant Lecturer Grade A	£450– 725
Assistant Lecturer Grade B	£525– 820
Lecturer	£965–1,065
Senior Lecturer	£1,065–1,215

Head of Department—according to grade.

The salaries quoted are for men ; women are paid somewhat less.

The scale for the Grade A Assistant Lecturer is identical with that of the basic Burnham Scale for teachers in schools.

In addition to the basic scales a London Allowance of £36 or £48 according to age is payable to all grades.

Assistant Lecturers, both Grade A and Grade B, are also entitled to an additional allowance of £60 if graduates and a further allowance of £30 if they hold a " good honours " degree.

REVIEWS OF BOOKS

Physics and Microphysics. By L. de Broglie, translated by Martin Davidson. (London: Hutchinson's Scientific and Technical Publications.) Pp. 286. Price 21s.

No physicist needs to be reminded that, in the decade when the ambiguity of the electron became critical through the experiments on diffraction, Louis de Broglie was the pioneer in developing the solution which we now call wave-mechanics. History therefore demands that products of his mature thought about the nature of physics should be read with respect.

Beyond such a general consideration, the merits of this book include its provocation to thoughtfulness of a kind often shirked in this country, and also flashes of that remarkable French clarity which delighted an earlier generation of mathematical and philosophical readers but has been less familiar in recent years. The chief defect of the book is a tendency to flicker from highly original ideas on profound topics really demanding fuller treatment, to topics more commonplace and doubtfully worth including. Perhaps a justification of the *mélange* is that even the most inconsiderable pages throw novel light on some point in the history of physics. The translator, Dr. Davidson, already a benefactor of all thoughtful readers in twentieth century astronomy and applied mathematics, has frankly juggled with the French material, in selections and omissions which make the mixture of subjects less strange to English habit.

But the very Gallic nature of the work raises an interesting query; attempts are commonly made to present physics as international in the sense of becoming independent of race or temperament of the physicist. This book is a healthy corrective to the error of supposing we can forget the personality of the physicist. We can trace here the emergence of wave-mechanics, expounded with the mastery of historical sense in which the French have excelled, but at each step associated with the problem faced by a particular individual in the sequence. Lucretius and Fresnel, as much as Heisenberg and even Bergson (strange to English readers to-day) are fitted into place in a tale which is historically homogeneous. But although we may value most this historical treatment, de Broglie himself (p. 70) confesses to "loving especially the philosophic view." Happy the nation where philosophic temperament is thus found among the greatest of purely scientific contributions to physics.

MARTIN JOHNSON.

Introductory Applied Physics. By N. C. Harris and E. H. Hemmerling. (London: McGraw-Hill Book Co. Ltd.) Pp. 729 + viii. Price 6.75 dollars.

This book, which is based on a course given in a Junior College in the U.S.A., is aimed at providing suitable training for the technician in industry. The authors define the technician as intermediate to the professional engineer and the skilled craftsman. The list of contents shows that all the conventional branches of physics are covered. Mechanics, properties of matter, sound, light, heat, magnetism and electricity are all included but closer inspection shows that the emphasis throughout is on practical applications. Considerable space is given to such subjects as refrigeration, air conditioning, heat engines, electric power generation and distribution, electronics and atomic energy. For example, air conditioning receives as much space as the whole of wave motion and sound including technical applications.

The authors state in the preface that theory is introduced as a basis for understanding application but not as an end in itself. To some extent this is an understatement ; throughout the book, theoretical considerations are kept in the background, and anything involving mathematics is avoided. Thus the formula for the focal length of a concave mirror is stated without proof. The Carnot cycle is mentioned and the formula for the efficiency of an ideal engine is given without any discussion of the principles involved.

One naturally considers such a book in relation to courses for the National Certificate in Applied Physics. The standard of mathematics and basic physics required is roughly S.1. However there is a great deal of practical information presented in an attractive manner which makes the book have some considerable value for applied physics at all stages. It can be recommended to teachers for reference purposes.

The book contains about 260 photographs. Some of these are extremely good, but the majority could have been omitted without much loss of educational value and with some reduction in cost.

M. R. GAVIN.

Atomic Energy Research at Harwell. By K. E. B. Jay. (London: Butterworth Scientific Publications, 1955.) Pp. 144 + xii. Price 5s.

This volume is in the nature of a progress report and gives the reader a good general picture of what has been happening at Harwell since the account published in 1952*. Some sections, however, deal with the work done over the whole of the Establishment's eight years of life, for it is only now that the information can be released.

* *Harwell—The British Atomic Energy Research Establishment, 1946-51.* (London : H.M. Stationery Office).

The report is divided into two parts. The first (76 pp.) deals with the major programmes and is written primarily for non-technical readers. The second part (62 pp.) is written for " scientific readers who have not specialized in the various fields discussed " and deals with selected researches carried out in the last two or three years.

Part I, while a little uneven, is generally good and satisfying ; the chapter on the development of electronic instruments which describes clearly and concisely the various counters in use and the associated equipment is an excellent piece of technical writing for the non-specialist. There are, however, occasional lapses, for example a phrase like " glass heavily loaded with lead . . . " (p. 63) may mislead a non-technical reader not familiar with lead-glass. The technical knowledge assumed varies—some terms being explained, whilst others are not.

Hints of the magnitude of the work and of the problems, technical and human, which have been solved—or almost solved—are given throughout the book ; and although few readers will meet them on such a scale, they will profit by reading of the energy and courage with which they were tackled. For example, there were problems of housing the staff and their families, of providing schooling for their children and technical education for the apprentices and learners at the establishment, some 250 of whom take examinations each year. Or again, in connexion with the transport problems, we read (p. 76) that a fleet of special buses carries 2,500 people to and from the establishment every day and runs $1\frac{1}{2}$ million miles a year ; or still again, we learn that the lathes in the workshops range from watchmakers' tools to those capable of turning work 3 ft. in diameter and 12 ft. long.

The three chapters in Part II deal with research in physics, in chemistry and chemical engineering, and in metallurgy. These divisions, let it be said, however, are not to be taken too seriously since one finds an account of the use of the plane grating in divergent light under chemistry and the effect of radiation on long chain polymers under metallurgy.

The glossary, for " the non-scientific reader," is a valuable feature which might usefully have been extended. Perhaps the " nicknames " of the reactors such as Dimple, Zephyr, Bepo, etc., might have been included in the glossary for the reader forgets which particular type they are. Incidentally, remembering that the origins of names in technology are soon forgotten or lost, one wonders whether some international agreement might be made before it is too late by which the name of a reactor clearly indicated the type to which it belonged, and was the same thoughout the world. The confusion in the naming of scientific instruments is well known, and will perhaps serve as an

awful example to nuclear physicists and engineers to act before it is too late !

This book deserves to be widely read first because it will make the reader generally, even if vaguely, aware of the remarkable advances in pure and applied physics, including scientific instruments, resulting from the work at Harwell, secondly because he will gain some idea of how to tackle outsize scientific and technological problems, and lastly, but by no means least, because there are some excellent examples of scientific writing in it.

H. R. LANG.

THE REGISTER

ELECTIONS TO MEMBERSHIP

An asterisk (*) indicates transfer from another grade

Fellows

*Barocas, Vinicio, Ph.D., Director, Jeremiah Horrocks Observatory, Preston.

*Cowhig, William T., B.Sc., Head of Technology Physics Dept., British Rayon Research Association, Heald Green, Manchester.

Dayal, Bisheshwar, D.Sc., Lecturer in Physics, Banaras Hindu University, India.

*Haslett, Roy W. G., B.Sc., Head of New Projects Section, Research Department, Kelvin and Hughes Ltd., Barkingside, Essex.

*Klemens, Paul G., M.Sc., D.Phil., Senior Research Officer, Division of Physics, Commonwealth Scientific and Industrial Research Organization, Chippendale.

Kronberger, Hans, B.Sc., Ph.D., Head of Laboratories, Research and Development Branch, United Kingdom Atomic Energy Authority, Capenhurst.

*Norbury, John, B.Sc., Ph.D., Chief Physicist, R.T.S.C. Laboratories, Whitchurch, Aylesbury.

*Richardson, Joseph F., M.Sc., Senior Physicist, Commonwealth Department of Health, University of Melbourne.

*Stanford, Robert W., M.A., Lecturer in Physics, Guy's Hospital Medical School, London.

Associates

Bateman, John S., M.A., Senior Scientific Officer, D.S.I.R. Mechanical Engineering Research Laboratory, East Kilbride.

Bingham, Stanley, B.Sc., Assistant Lecturer in Physics, Royal Technical College, Salford.

Bullen, Thomas G., M.Sc., Ph.D., Professor of Physics and Chairman of the Science Division, Iona College, New Rochelle, New York.

Chapman, John A., B.Sc., Ph.D., British Rayon Research Fellow, Research Laboratory, Physical Chemistry Department, Cambridge.

*Clark, Sheena M., B.Sc., Ph.D., Lecturer in Physics, University of St. Andrews, Queen's College, Dundee.

*Cooper, Raymond, Ph.D., Research Physicist, University of Bristol.

Crosland, Ronald, M.A., Senior Physics Master, Christ's Hospital, Horsham, Sussex.

Domanic, Fahri, Ph.D., Lecturer, University of Ankara, Turkey.

Ecclestone, Leslie, K., B.Sc., Senior Science Master, King's Norton Grammar School for Boys, Birmingham.

*Gill, David A., B.A., Senior Scientific Officer, British Paper and Board Industry Research Association, Kenley, Surrey.

*Gray, Leonard R., B.Sc., Senior Scientific Officer, Royal Naval Scientific Service, Admiralty Signal and Radar Establishment, Portsmouth.

Harris, Alfred H., B.Sc., Technical Assistant, Chance Brothers Ltd., Firhill, Glasgow.

Harrison, Roger D., B.Sc., Assistant Lecturer in Physics, University College of North Staffordshire.

Jahn, Richard E., B.A., Senior Physicist, The British Oxygen Company Ltd., London.

Jonscher, Andrzej K., B.Sc., Ph.D., Senior Scientific Staff, The General Electric Company Ltd., Research Laboratories, Wembley, Middlesex.

*Kennedy, Joseph W., B.Sc., Physicist, United Kingdom Atomic Energy Authority, Capenhurst.

McCulloch, James S. G., B.Sc., Ph.D., Scientific Officer, United Kingdom Atomic Energy Authority.

Mather, Keith B., M.Sc., Senior Research Officer, Australian Atomic Energy Commission, University of Melbourne.

*Marsden, James P., B.Sc., Ph.D., Technical Officer, "Terylene" Council, Imperial Chemical Industries Ltd., Welwyn Garden City.

*Mitchell, James I., M.Sc., Assistant Lecturer, Department of Physics and Mathematics, Acton Technical College, London.

*Nicholson, Kenneth P., M.Sc., Research Officer, Australian Atomic Energy Commission, Atomic Energy Research Establishment, Harwell.

*Pomeroy, Charles D., B.Sc., Scientist, National Coal Board Central Research Establishment, No. 2, Isleworth, Middlesex.

Popper, Paul, B.Sc., Chief Physicist, Material Research Laboratory, Philips Electrical Ltd., Mitcham, Surrey.

Quested, Derek R., M.Sc., Engineer, Ministry of Supply.
*Reid-Jones, Rowland C., B.Sc., Technical Officer, Steatite and Porcelain Products Ltd., Stourport-on-Severn, Worcs.
Roberts, Allan S., B.Sc., Mathematical Physicist, British Rayon Research Association, Manchester.
Sherwin, Reynold J. S., B.Sc., Geophysicist, The British Petroleum Company Ltd., London.
*Smith, Gallienus W., M.Sc., Research Physicist, British Insulated Callenders Cables Ltd., London.
Stops, Denis W., B.Sc., Ph.D., Senior Lecturer, Applied Physics Department, Northampton Polytechnic, London.
*Turner, Gerard L'E., B.Sc., Scientific Staff, Research Laboratories, The General Electric Company Ltd., Wembley, Middlesex.
*Williams, William W., B.Sc., Assistant Lecturer, West Kent Technical College, Tunbridge Wells, Kent.
*Yates, David J. C., B.Sc., Ph.D., Research Physicist, Ernest Oppenheimer Laboratory, Department of Colloid Science, University of Cambridge.

Graduates

*Allen, Lindsay A., Research Student, University of Western Australia.
Burd, Alexander N., B.Sc., Research Student, Acoustics Laboratory, University of Liverpool.
*Collins, John G., B.Sc., Research Student, University of Western Australia.
Davey, Frederick, B.Sc., Student, University of Reading.
Davis, John C. H., B.A., Graduate Apprentice, British Insulated Callenders Cables Ltd., Prescot, Lancs.
De Laeter, John R., B.Sc., Student, Teacher's Training College, University of Western Australia.
*Dick, Dorothy M., B.Sc., Technical Assistant, Kelvin & Hughes Ltd., Glasgow.
Freedman, Ronald, B.Sc., Engineer, A. C. Cossor Ltd., London.
*Gowler, Edmund J., B.Sc., Junior Engineer, Electric and Musical Engineering Development Ltd., Feltham, Middlesex.
*Hanscomb, John R., B.Sc., Demonstrator, Physics Department, University of Queensland.
Hargreaves, John K., M.Sc.
Hurle, Ian R., B.Sc., Research Student, University of Cambridge.
*Hutchison, Thomas O., B.Sc., Plant Manager, Imperial Chemical Industries Ltd.

Jephcott, Donald F., B.Sc., Physicist, Sir W. G. Armstrong Whitworth Aircraft Ltd., Coventry.

*Johnston, Gordon H., B.Sc., Graduate Apprentice, The Sperry Gyroscope Company Ltd., Brentford.

Lawrence, Roy, B.Sc., Research Student, University of Liverpool.

MacCarvill, Patrick D., M.Sc., Technical Assistant, Methods and Standards Group, British Cellophane Ltd., Bridgwater, Somerset.

McTernan, Allen J., B.Sc., Junior Electronic Engineer, Electric and Musical Industries Engineering Development Ltd., Hayes, Middlesex.

*Manuel, John A., B.Sc., Scientific Officer, British Iron & Steel Research Association, London.

Musk, Gordon M., B.A., Assistant Master, The High School, Newcastle-under-Lyme.

O'Connor, Brian M., B.Sc., Postgraduate Student, University of Natal.

Parkyn, David Moseley, B.Sc., Research Student, Department of Physics, University College of Swansea.

Preston, Ian M. H., B.Sc., Research Student, University of Glasgow,

*Richards, John P. G., B.Sc., Research Student, University College, Cardiff.

Singleton, Donald G., B.Sc., Temporary Lecturer in Physics, University of Queensland.

*Smith, John S., B.Sc., Telemetry Engineer, The Bristol Aeroplane Company Ltd., Bristol.

Snell, Leon N., B.Sc., Scientific Officer, United Kingdom Atomic Energy Authority.

Strike, Douglas T., B.A., B.Sc., Experimental Officer, H.M. Underwater Detection Establishment, Portland, Dorset.

Summerton, Marian E., B.Sc., Physicist, National Coal Board (South Western Division).

Voles, Roger, B.Sc., Engineer, Electric and Musical Industries Engineering Development Ltd., Hayes, Middlesex.

*Vulkan, George H., B.Sc., Technical Assistant, Physics Section, Research Department, London Transport Executive.

Wallace, Sydney K., B.A., Instructor Lieutenant, Royal Navy.

Williams, John L., B.Sc., Research Student, Mining Department, University of Birmingham.

*Williams, Paul R., B.Sc., Research Student, University of Liverpool.

*Young, William, B.Sc., Technical Officer, Imperial Chemical Industries, Ltd.

Engineers and Physicists.

Ferranti Limited in their new Laboratories are engaged in a programme of electronic development of great industrial importance. The work involves the use of digital computors to control machines and industrial processes and covers a wide and expanding field of application, offering long-term interest to those engaged in it.

Development activity for these projects is taking place in the field of electronic circuitry (including pulse technique), digital computers, magnetic recording and servomechanisms. Engineers and Physicists having experience as well as interest in one or more of these subjects are invited to apply.

The appointments are permanent and offer full scope for initiative in an expanding organization. A salary commensurate with the qualifications required will be paid. Staff pension scheme. Application form will be sent on request (quoting Ref. 40/EP/AL) to the Personnel Officer, Ferranti Limited, Ferry Road, Edinburgh, 5.

British Petroleum Co. Ltd. has vacancies for **geophysicists** on its exploration staff. Candidates should have an honours degree in physics with subsidiary mathematics and/or geology, but candidates with a general degree will be considered. The work involves delineation of underground rock structure by seismic, gravitational and magnetic techniques and offers considerable scope for men with initiative who are prepared to travel and to work abroad. Normal leave is four months after two years' foreign service.

When conditions permit, facilities are afforded for married men to have their families with them on foreign tours.

Basic salary is commensurate with age and experience, commencing at £870 for young, inexperienced graduates. Appropriate allowances are paid whilst on foreign service. Generous pension scheme.

Applications quoting F.107, should be addressed to Box 1442, c/o 191 Gresham House, E.C.2.

Victoria University College
(Wellington, New Zealand)

Applications are invited for a **Lectureship in Physics.**

The salary will be £911 7s. 0d. per annum, rising by annual increments of £50 to £1,061 7s. 0d. The initial salary will be determined according to the qualifications and experience of the appointee. (University salaries are at the present moment the subject of discussion between the University Grants Committee and the Government).

An allowance is made towards travelling expenses ; duties to be assumed on 1st February, 1956, or at such other date as may be agreed on by the College Council.

Further particulars and information as to the method of application may be obtained from the Secretary, Association of Universities of the British Commonwealth, 36 Gordon Square, London, W.C.1.

The closing date for the receipt of applications, in New Zealand and London, is October 15, 1955.

" Shell " Research Limited require a young **physicist** or **physical chemist** with a good Honours Degree for training in both laboratory and field studies relating to bitumen development and the scientific aspects of roadmaking. Salary in line with qualifications and past experience. Write giving full details to the **Shell Petroleum Company,** Staff Department R/T/B, St. Helen's Court, Great St. Helen's, London, E.C.3.

Imperial Chemical Industries Limited, Dyestuffs Division, invites applications from **physicists** for a position in the Physics Section of the Research Department. The work, which is concerned with the development of physical techniques applicable to problems arising in organic chemical research, provides a wide variety of topics for investigation and offers scope for scientific initiative. The position also offers good financial prospects to suitable applicants, who should possess a good honours degree in physics, be under 30 years of age and preferably have had some research experience. Please write in detail to the Staff Manager, I.C.I. Ltd., Hexagon House, Blackley, Manchester, 9.

Investigators required to study problems in physical metallurgy, including alloy development, and in instrumentation of metallurgical processes. Initial salary up to £1,000 per annum according to qualifications and experience. Write : Secretary, **British Non-Ferrous Metals Research Association,** Euston Street, London, N.W.1.

Bakelite Limited have a vacancy at their Tyseley, Birmingham, works for a young **physicist.** Applicants should have a B.Sc. degree or equivalent. The work is concerned with the physical testing of plastics. Salary will be in the range of £600 to £800 per annum in accordance with age and experience. Applications should be addressed to Personnel Manager, Bakelite Limited, Redfern Road, Tyseley, Birmingham.

There is a vacancy for a **Nucleonic Instrument Engineer** in the Atomic Energy Department of **The General Electric Company Limited.**

Applicants should have a degree in electrical engineering or physics and several years' experience in electronic engineering. The appointment is a senior one, carrying a good salary with opportunities for advancement. Application should be made to Personnel Manager, Fraser & Chalmers Engineering Works, Erith, Kent.

British Thomson-Houston Co. Ltd. has a vacancy in its Research Laboratory at Rugby for a qualified **Physicist** to work with a team of chemists on the application of Mass Spectrometry to the study of solids, including semi-conducting materials. This work is just starting and offers interesting possibilities in expanding applications. Applicants are invited to submit details of their age and qualifications to the Director of Research, British Thomson-Houston Co. Ltd., Rugby, quoting Reference JJ.

Graduates

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